

ULTIMATTE - 4

PART 1: Installation Instructions, page 1.

PART 2: Operating Instructions, page 5.

Installation and Hook-up (PART I)

Connections (See Fig. 2)

1. AC power 115V, 50/60 Hz (can be wired for 230V).
2. Sync.
3. Blanking.
4. Black burst. Needed only when recording matte signal.
5. RGB into "FOREGROUND". RGB may be obtained from either a camera or film chain. RGB from a decoder is not acceptable. "Y" input is for those cameras (RCA TK-44, etc) that provide a separate "contour signal" (not a luminance channel). Contour signal may be mixed into RGB by moving S10, contour mixing jumper Fig. 4A, to ON position.
6. Composite video into "BACKGROUND".
7. "Matte input" and "Matte output" are special functions to be described later. (NOTE: "Matte" is a linear, variable level, "Key" signal.)
8. "WINDOW MONITOR" (if used) may be TEE connected into any monitor so as to observe window position.
9. Connect RGB (and Y, if used) to encoder. Encoder output is the final picture.

### Encoder:

The UltiMatte RGB output is the final picture, and must be encoded before recording. Some cameras, RCA TK-44, and some Norelco models, permit interruption of the RGB lines which permits the UltiMatte to be inserted between the camera and its encoder. When the RGB lines cannot be interrupted, one must use a separate encoder. Since the background scene will be "passing-thru" the encoder, it must pass that portion of chroma that is negative. The 3-M encoder does so. The Telemation 2000 and 3000 encoders clip black level and may slightly inhibit the chroma of high chroma signals. The black level clip can be removed on Telemation encoders as follows:

On the Telemation TCE-2000: Open diode CR108 and  
readjust set-up pot R137.

On the Telemation 3000: Open diode CR425 and readjust  
the pedestal pot.

The above procedure was suggested by Rex Hicks of  
Telemation (801) 972-8000.

An alternate hook-up of UltiMatte, described under "Switcher Integration", does not pass the background scene thru the encoder, and does not require the above encoder modification.

### Internal Adjustments

Those adjustments that rarely require adjustment are located on the PC Board. The PC Board contains two kinds of pots. The small square pots should not be adjusted without appropriate test signal and oscilloscope. The large round pots with the large screw-driver slot may be adjusted by the technician, with the effect of the adjustment observed on his monitor.

### Sync Timing

The sync pulse is used by UltiMatte to generate a black level clamp. The clamp is a 1 microsecond pulse, and can be positioned anywhere along the back porch by means of the "CLAMP DELAY" pot on the PC Board. (Fig. 4B) The clamp pulse may be observed on test point 5. Position the clamp pulse between color burst and start of video.

### Blanking Timing

Blanking to the UltiMatte should be in time with the blanking from the foreground camera as it arrives at the UltiMatte. Any difference in timing will widen the blanking interval.

### Background Timing

When connected as above the background scene will be "passing-thru" the encoder, and will be delayed approximately one microsecond. The background scene must therefore be advanced by one microsecond.

### Phasing

The 3.58 color signal in the background scene must be rotated to match the phase of the 3.58 being encoded into the foreground scene.

### Switcher Integration (Mix after encoding)

The hook-up described earlier passes the background scene thru the encoder. The background scene is therefore delayed by the delay of the encoder. This delay is inconvenient when UltiMatte is to be integrated into a switcher. However, it is possible to re-connect the UltiMatte so that the BG scene does not pass thru the encoder. This eliminates the encoder delay.

The configuration for "mix after encoding" is as follows:

1. Re-connect the cabling at the rear panel as shown in Fig. 3.
2. The internally generated Key signal must be delayed by the delay of the encoder (about 850 NS for NTSC). The 850 NS adjustable delay is connected as shown in Fig. 3. The six steps of the Key Delay switch (Fig. 4G) provides six steps of delay of 15 NS per step. Exact timing is obtained by observing the matted image.
3. Re-connect Cambion jumpers S16 (Fig. 4H) to the vertical (internal) position as shown in Fig. 4H. This routes the BG scene directly to the mixer stage.
4. Remove Cambion jumper S15 (Fig. 4J) and store in adjacent socket. Removing S15 opens the key circuit for insertion of the 850 NS delay line at the rear panel.

### Backing Color Requirement

The blue and green Chroma-key paper, fabric and paints are generally unsatisfactory for use with UltiMatte. UltiMatte does not require high luminance. It does require a high Blue-Green difference.

Testing the quality of a blue surface is best done in conjunction with a chip chart. This chart establishes the light level to achieve 100 units for white. At this light level the RGB units for samples of various blue (or green) backing materials can be determined.

A suitable blue surface will provide (on the waveform monitor) at least sixty units of blue and will be at least 40 units higher than green. At only 50 units of blue or when the blue-green difference is less than 30 units, results are marginal to unacceptable.

Satisfactory blue paints available in the Los Angeles area are:

1. #8580 Ultra Marine Blue, manufactured by the Paramount Paint and Lacquer Co., a division of Zolotone Process, Inc., 3411 E. 15th. Street, Los Angeles, CA 90023. Phone (213) 269-9231.
2. A paint having somewhat superior blue reflectivity is manufactured by the 7-K Color Corp., 927 N. Citrus Avenue, Hollywood, CA 90038. Phone (213) 464-7361. It is identified as Special DCU Blue Matte Finish Scenic Infinity Paint #SC-71-3-60. This paint is slightly less resistant to scuffing from foot traffic.

Both paints are water base paints that dry in 20 to 30 minutes. Both paints have high blue reflectance and a high blue-green difference.



## OPERATION (PART 2)

### Matting versus Keying

UltiMatte is not a keyer. It does not switch between foreground and background. The foreground channels are always wide open. The function of UltiMatte is to suppress (by a matting technique) the unwanted colors of the backing, and to turn on the background scene to the extent it was not obscured by objects or substances in the foreground.

### Adjustment Principles

Consistently flawless results are possible with UltiMatte providing two principles are recognized and applied. The first principle can best be summarized with the phrase "junk in junk out". At the beginning of each set-up, always switch to foreground only. Examine the picture and the waveform monitor very closely. Now is the time to identify problems that may exist on the set. Is the backing lit evenly? Is there a dark corner or a hot spot in the center? Is a backlight kicking up glare off the floor? Are there blue reflections off of foreground objects that are so obvious that they can be seen even before a matte is attempted? Have blue set pieces been placed so that dark areas are created? Is there a dark scuff mark that needs cleaning or repainting? It is more efficient to perform a pre-set-up examination where obvious errors are easily identified and immediately corrected than to attempt the UltiMatte set-up procedures and spending precious time rendering a poor compromise, then discovering that the only way to achieve an acceptable composite is to alter some condition that exists on the set. This is one aspect of the "junk in junk out" principle.

The other aspect of this principle deals with problems on the set that are not immediately identified on a pre-set-up examination. After the UltiMatte set-up procedures have been performed and the finished composite results in a compromise that may only be marginally acceptable, it is up to the operator of the UltiMatte to call attention to changes that can be made on the set to improve the quality. This information can then be used by the director to determine if he can afford the time to make these changes. Without this information the director has no choice but to accept what he sees on his screen.

The second principle that must be recognized and applied in order to achieve consistently flawless results is that a flawless composite requires a linear system. To the extent permitted by conditions on the set, the operator should attempt to keep the system linear. Linearity is achieved by not pushing the mattes into the zero clip; by not pushing BG turn-on into the BG level clip; and by not using the Black Gloss or Clean-UP controls. It is always possible to avoid pushing the signal into the turn-on and zero clip. It is not always possible to avoid the use of Black Gloss and Clean-Up. When one departs from linearity, something is lost. Sometimes, however, it is desirable to lose certain elements of the foreground scene such as visible support wires.

Never advance a control further than is absolutely necessary.

### Adjustments

Please refer to Fig. 1 showing the front panel.

1. Set all switches to the right.
2. Set all pots to the indicated index mark.

FG Matte: The first control group of Fig. 1.

The function of these controls is to develop a black silhouette of all opaque FG objects and a partially transparent silhouette for partially transparent objects. In order to see the silhouette, it is necessary to have a BG scene that is both bright and uniform. The test signal switch provides this uniform background.

### Procedure

1. Both switches to left.
2. Adjust SUBJECT pot to just reach an opaque silhouette where the object was opaque. (Black or glossy objects may not go black due to blue screen reflection). Ignore very small areas that do not go black.
3. Adjust BLK GLOSS (as little as possible) to obtain matte in glossy areas. Use this control only when print-thru occurs in black or glossy areas.
4. The anti print-thru control, which sets an exact zero for the BG 4-quadrant multiplier, rarely needs adjustment. A bright BG object will print-thru the FG from dark to light as the control goes thru zero.

5. The reference color (REF CLR) should be fully toward HI when bluish wardrobe is used. Turn pot a little toward LO when using a low quality blue backing or when needed to get the background scene fully turned on.
6. Small bright lines or spots in the silhouette are caused by registration errors. When registration errors are excessive, they will appear as a colored edging on the FG objects. If noticeable in the picture - re-register the camera. Small errors are usually not visible in the picture.
7. Return switches to the right.

BG Matte: Second group of controls of Fig. 1.

The function of the BG MATTE is to suppress the blue, green and red content of the blue screen. Typically these values are 70 units blue, 30 units green, and 20 units red. The RGB MASTER pot supplies voltage to the RGB individual pots. If a blue floor is used in addition to a blue wall, the following procedure applies only to the (vertical) wall area.

Procedure

1. Set switch to left.
2. Set Master to index bar.
3. Observe waveform monitor (and picture monitor) and adjust RGB controls until blue wall area just approaches zero level. (Do not go below zero, because small detail will be lost.)
4. If a blue floor is also used, it will not go black at the above settings because of dust and overhead lighting glare. Removal of the floor is covered in control group 5.

Background: Third group of controls of Fig. 1.

Several controls affect the background as follows:

1. Level Adjust the level control while watching a waveform monitor. Advance level until the brightest areas of the blue screen are fully turned-on. Beyond full turn-on, shadow areas will thin-out and vanish, and object edges may brighten. Full turn-on is achieved when level control reaches its internal clip level.

2. Shadow Clockwise rotation darkens shadows without affecting the FG image. However, shadow noise is increased. NOTE: "Black Gloss" control also darkens the darker shadows without introducing noise. Use the shadow control only when necessary.
3. Glare/Noise This control operates only in the blue screen region and will eliminate shadow noise. It also brings up the shadow density on a blue floor that is otherwise obscured by floor glare.

Procedure

1. After setting LEVEL control, slowly advance GLARE/NOISE control until it just begins to take-over control by reducing background level. Advance just enough to reduce noise or glare.
  2. At this point advance LEVEL control just slightly so as to return background to normal level.
  3. Very slightly advance the MASTER BG Matte control to return blue screen area to black.
4. Focus Reserved for future mod.
  5. PED This adjustment permits pedestal control of the background scene under certain conditions.

WARNING:

If incoming blanking does not match background signal blanking, use of PED control to lower pedestal may result in generation of luminance components below blanking level. This may be avoided by insuring that background blanking is narrow compared to incoming blanking. If this cannot be achieved PED control should be left in the CCW position and background pedestal adjustment should be made at the source.

6. TS Gain This control varies the level of the background test signal. The color of the test signal is adjusted by RGB pots located on PC Board Fig. 4C.

FG/BG: Fourth group of controls of Fig. 1.

1. The FG switch permits a direct look at the FG camera only. It shuts off the background and by-passes the matting circuits. The FG GAIN control provides a gain of 1.0 when set at the index mark. It also permits realistic night scenes by controlling the level of the FG after it is matted.
2. The BG switch permits a direct look at the background scene only. The BG CLIP control establishes the stop point into which the background LEVEL control operates.

Clean-Up, Fade/Mix, Bal, and Lum/Ext Key: Fifth group of controls of Fig. 1.

The OFF-ON switch shuts-off all the functions in this group including CLEAN-UP, FADE/MIX, BAL, and the LUM/EXT KEY. This switch must be ON in order to use these functions.

Clean-UP

Since UltiMatte is a linear system it shows everything seen by the camera, including the seams in the backing, scuff marks and foot prints on the floor, as well as unwanted shadows and uneven lighting. The function of the CLEAN-UP control is to depart slightly from linearity. This departure causes floor glare, foot prints, scuff marks, and very light shadows to drop-out. In effect, it cleans-up the picture. the CLEAN-UP control also drops out other (desirable) transparent objects such as glassware, individual strands of hair, smoke, etc. DO NOT USE MORE CLEAN-UP THAN NECESSARY. The residual floor dirt, glare, scuff marks, etc., if not removed, will transfer to the BG scene. However, if the BG scene contains a floor or roadway, etc., the occurrence of such residual material is often very realistic and desirable.

Bal

Normally the Clean-Up should be applied equally to both the FG and BG. However, depending on the nature of the scene, a better picture is sometimes obtained when the BAL control is turned a little off-center to favor either the FG or BG. At the extreme rotation to BG, one obtains a bright halo which is sometimes useful. At the extreme rotation to FG, one obtains a black outline (which is rarely useful).

All of the functions in this group generate a voltage or signal that is fed to the BAL control which proportions the signal equally or unequally to the FG and BG. Any signal fed to the FG reduces or shuts it off. Any signal fed to the BG increases or turns it on.

#### Fade/Mix

Assuming the BAL control is centered, the FADE/MIX control causes the FG objects to become increasingly transparent and fade away. The background scene remains. This control is useful in causing objects to materialize, to disappear or to remain in some partial state of transparency.

If the BAL control is turned fully to FG, the FG objects fade to a black silhouette. If the BAL control is turned fully to BG, the BG scene and FG objects are fully and simultaneously turned-on, which causes the video output to exceed 100 units.

If the FG switch is set to "DIRECT", then the FADE/MIX control causes a simple mix between the two video sources. The mix function is useful when setting blue set pieces on the blue set to match specific objects in the background scene. The MIX function allows both scenes to be observed simultaneously.

#### Lum/Ext Key

These are special functions for special purposes.

##### Lum (Streak photography)

This function permits the superimposing of streak photography or cartoons consisting of bright colors against a black field. If any color is at or above the selected threshold (selectable between 30 and 100 video units) it can be matted into the background scene with the background fully suppressed. That is, no background will show through the colored character. The character becomes progressively transparent as its brightness drops toward black. If, for example, the threshold is set at 50 units, then if either R, G, or B is 50 units or more, the object is opaque. As the highest of R, G, or B drops below the set threshold, the subject becomes progressively more transparent, and is fully transparent when black.

### Procedure

1. Set FG switch to DIRECT.
2. Set LUM/EXT switch to LUM.
3. Turn BAL control fully clockwise to BG.
4. Turn BG ENABLE control clockwise just enough to fully turn-on the BG scene.
5. Turn DENSITY control clockwise just enough to make the FG objects non-transparent. The DENSITY pot controls transparency.

(When the LUM/EXT switch is to LUM, the -, + switch is not active.)

### Ext Key

When the LUM/EXT switch is thrown to EXT, UltiMatte will accept an external matte (key) signal. This external signal may originate from a switcher or may consist of a recording of the UltiMatte matte signal. The recorded matte signal permits post production matting, and matting a second object behind a previously matted object. This permits a person already matted to walk completely around himself.

### Procedure for EXT key from a switcher

1. Connect switcher output to UltiMatte "Matte input".
2. Set-up window or circle on switcher.
3. Set -, + switch to +.
4. Set BAL control to index.
5. Set KEY GAIN control so that + 0.7 volts from switcher fully turns-off FG and fully turns-on BG.
6. To reverse the turn-on, turn-off areas, throw the -, + switch to - and bring up BG ENABLE control until BG is turned-on in the previously turned-off areas.



Procedure for Recording for Post-  
Production Matting

1. Set-up UltiMatte during the original shoot with proper matting verified using the UltiMattes Test Signal as a background scene.
2. With no background scene connected to UltiMatte, and with test signal OFF, the FG action will appear to occur in front of a black backing. Encode and record this foreground scene with time code.
3. Connect the "MATTE OUT" output to a second tape machine and record the black and white matte signal using time code. These two tapes will permit post production matting of one or more backgrounds with the same high quality achieved from a live camera. NOTE: Be sure "Black Burst" is connected into UltiMatte so as to insert sync and color burst when recording the matte signal.

The level of "MATTE OUT" is set to IV PP using the matte gain pot of Fig. 4D.

Procedure for Post-Production Matting

1. Connect composite output of FG tape machine to "Y" foreground input channel.
2. Use a short jumper cable to connect "Y" output to rear panel jack marked "FROM U-M ENCODER". Terminate.
3. Move two Cambion plugs S16, Fig. 4H, to "internal" position as shown in Fig. 4. (This connects the BG channel into the Composite Picture mixing stage.)  
NOTE: S10, Fig. 4A, must remain OFF.
4. Connect matte tape reproducer to KEY-IN and drop set-up to zero at the tape machine.
5. Connect output of background tape machine to UltiMatte BG input.
6. Connect a recorder to "Composite Picture" output jack.



7. Set LUM/EXT switch to EXT.
8. Set -+ switch to +.
9. Set BAL control to BG.
10. Start all three tape machines and set KEY GAIN control to obtain full turn-on of background. NOTE: FG tape and Matte tape must start in frame sync.

(To see the BG scene while retaining FG sync and burst, turn FADE control to FULL ON.)

Procedure for Mating an Object Behind a Previously Matted Object

1. When the object was first matted, record the matted scene with time code. This becomes the new BG scene.
2. Also record the matte signal with time code.
3. Connect the playback of the matted scene of Step 1 to BG input.
4. Connect the playback of the matte signal in Step 2 to Key input.
5. Connect live camera RGB to FG input. Cap lens or otherwise remove all signal from RGB inputs.
6. Set LUM/EXT switch to EXT.
7. Set -+ switch to -, and center BAL control.
8. Advance BG ENABLE control just to full turn-on of BG.
9. Advance DENSITY control until all of the BG scene excepting the previously matted object goes black.
10. Open camera lens and fill its field with blue backing plus a foreground object.
11. Produce a normal matte on the FG object. When the BG LEVEL control is properly adjusted, the BG elements suppressed in Step 9 are returned to full level.

12. Any FG object that passes across the previously matted object will appear to pass behind it.
13. For the second object to circle the first, it is necessary to shut-off the matte signal when the second object is to pass in front of the first object. This may be done by turning off the BG ENABLE control.
14. One object can be made to smoothly dissolve through the other by operating the BG ENABLE and DENSITY controls simultaneously. A slightly less linear dissolve is obtained by using the BG ENABLE control alone.

Color Logic Gates: Sixth control group of Fig. 1.

The two logic gates control the colorimetry associated with the color of the backing. Logic gate 1 controls the reproduction of blue colors. Logic gate 2 controls the reproduction of magenta, and eliminates all blue flare from skin tones, wardrobe, the chip chart, and from within the camera lens (when using a blue screen).

Procedure

1. Turn color logic CLIP LIMIT control (screwdriver) fully clockwise and turn gate 1 pot fully clockwise, and gate 2 pot fully counter-clockwise.
2. Place FG switch to DIRECT.
3. Turn off lighting on blue set so as to minimize blue light on the chart when chipping the camera. Chip the camera; and,
4. Switch the FG switch to MAT.
5. While observing waveform monitor of chip chart waveform, turn COLOR LOGIC CLIP LIMIT control counter-clockwise until evidence of blue clipping is just evident in the chip chart waveform.

This clip limit control gets rid of all blue flare on the set and on FG objects. It may be adjusted while watching the picture.

NOTE: Because UltiMatte eliminates all blue flare (in the lens, on faces, wardrobe, etc.) the "direct" camera view and the "matted image" will not match. The matted image will always be a little warmer. The matted image is what the camera would have seen in the absence of the blue screen.

### Magenta Objects

If a blue screen is used, magenta colors on the foreground will be reproduced as shades of red. If it is necessary to hold the magenta color, logic gate 2 must be opened (clockwise). By permitting enough blue to reproduce magenta, one also permits all of the blue flare on the set to tint faces, wardrobe, etc.

### Green Backing

When using a Green backing, it is necessary to swap the Blue and Green video lines into and out of the UltiMatte.

When a Green backing is used, one should try to avoid yellow colors. With gates 1 and 2 closed (CCW) there will be no Green flare or tint to hair, faces, or wardrobe. However, yellow will reproduce as red. In order to reproduce a yellow color when using a Green backing one must partially open gate 2. This will also permit green tinting to FG objects.

### Window: Seventh control group of Fig. 1.

The Window permits overshooting of the blue backing. Each of the four controls adjusts one of the four edges of the picture. The function of the Window is to shut off the FG and turn-on the BG. In effect, the Window mask becomes an electronic extension of the colored backing. Internally is a + window switch (Cambion plug) marked S12, Fig. 4E. The "-" position permits a corner to be masked.

The miniature phone jack permits the use of an external control for each edge. (Use a 10k pot.)

A Cambion jumper S6 on the PC Board (Fig. 4F) permits full disconnect of the window circuits in the event of malfunction.

The window is also useful in checking the BG level and BG mattes. Drop the window at the top about one inch down into the picture. The window causes full BG turn-on and full FG shut-off. Matching the color and level at the window edge (without Clean-Up) is a visual means of finding the level clip and the zero level for the RGB mattes.

### Using the Colorizer

When the Test Signal switch in the first group of controls is turned ON, the background scene (if any) is replaced by a clear field of color. The brightness (level) of this color is controlled on the front panel with the TS Gain control (Group 3). The actual color is determined by the adjustment of the individual RGB pots shown in Fig. 4C.

The colorizer may be used to generate a colored background when such a background is desired.

### Colored Titles (Solid or Transparent)

If white characters on a black field are the subject for a black and white (no chroma) camera, the camera output can be connected to the Key-In jack of the UltiMatte. A positive signal at this jack turns OFF the FG scene and turns ON the BG scene. If the BG scene is the colored test signal, then the white characters become the color of the test signal.

The Group 5 switches should be to the right to EXT and +. The Key Gain control determines the opacity/transparency of the characters. The BAL control, at center, causes the FG to go OFF and BG to come ON (a trade). With the BAL control toward FG, the FG is shut OFF but the BG is not turned ON. This produces dark or black characters. With the BAL control toward BG, the BG is turned ON, but the FG is not turned OFF. This causes the characters to glow as though they were fluorescent.

Because UltiMatte is linear, there is no tearing at the edges of the character.

## LIGHTING CONSIDERATIONS

### Handling Floor Glare

A line of sight from the camera to the blue floor makes a rather small (acute) angle to the floor. At this angle (and with overhead or back-lighting) the floor reflects a large component of white light. In fact, the blue floor often appears to be a grey floor because of the white-light component.

For all practical purposes (and to the UltiMatte) one may as well have laid a thin milk-white piece of plastic over the blue painted floor. The UltiMatte reproduces this white-light component, and lays it over the background scene. Such an overlay is sometimes acceptable if the background scene is a floor, a street or other plain surface that could have reflected this amount of white-light.

If the residual floor glare cannot be tolerated, it can be eliminated by using the CLEAN-UP control. However, this control also eliminates other transparent objects as well as the lighter shadows. The preferred method of eliminating floor glare and automatically enhancing floor shadows is to place a sheet of HN38 polarizing material in front of the camera lens. By rotating the polarizer, one position will be found that almost completely eliminates floor glare. The use of the polarizer is strongly recommended when doing floor shooting. The polarizer loses one stop of light. Increasing the light level is preferred to a wide open lens because of lens vignetting when full open.

### Holding or Losing Shadows

One can have dense-black shadows, medium shadows, pale shadows or no shadows depending on the lighting. The shadow controls on the UltiMatte can help, but the basic shadow control is achieved in the lighting.

For dense-black shadows. Turn on the key light first and obtain 70 units of blue intensity just outside the shadow. Then light the rest of the blue set to 70 units without using any fill in the shadow. The shadow region should show no more than 15 to 20 units of blue for a dense-black shadow. Shadow density is controlled only by the fill light, not by the key light.

For medium to light shadows. Light as above except add a little fill light to the shadow area.

For no shadows. Light the set to a uniform level of 70 units of blue. This level provides full turn-on of the background. Place the actor in position. If he casts a shadow bring up the fill to return the light level in the shadow to 70 units. Add a key and back light if desired to model the figure. Ignore the shadow cast by the key light. Since the shadow was already at 70 units (full BG turn-on) it will not reproduce. Any residual shadows (below 70 units) can be eliminated by using a very small amount of CLEAN-UP control. Use it sparingly as it also drops out fine detail, smoke etc.

Holding Fine Detail: including individual strands of hair, smoke, glassware, etc.

UltiMatte is a linear system unless it is purposely adjusted to be partially non-linear. In its linear condition, it holds and mattes everything seen by the camera including every seam in the backing, every scuff mark on the floor and the full and natural range of transparencies of smoke or glassware. To hold everything seen by the camera it is necessary to have a smooth flawless backing. It is also necessary to avoid the use of the CLEAN-UP control.

It is essential to set the RGB background mattes to bring the backing just barely to black. In fact, if one backs off from black by 2 or 3 units for each color, it is the equivalent of setting in just a little pedestal. This assures that the slightest wisp of steam, smoke or dust will be held, and so will individual strands of hair. With the above adjustment, any detail or substance within the reproduction capability of the camera will be properly matted and retained.

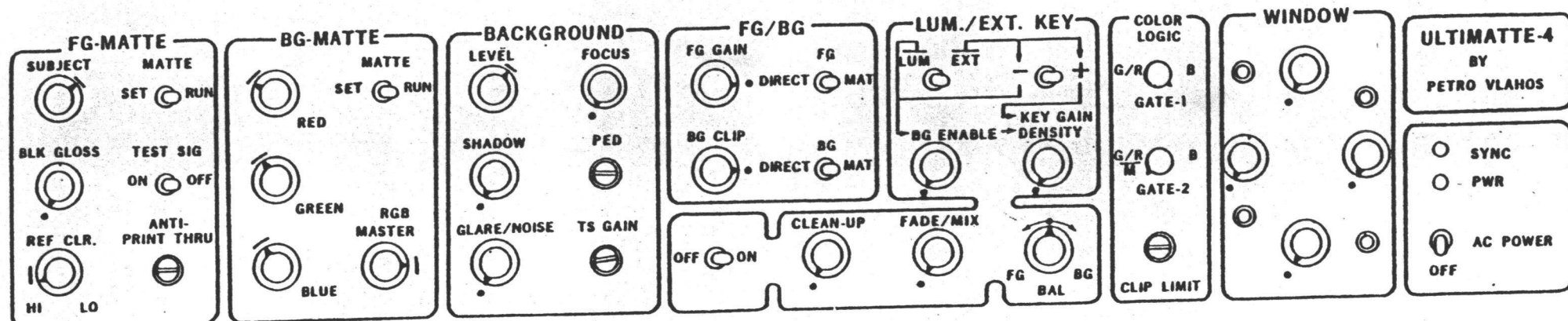


FIG. 1

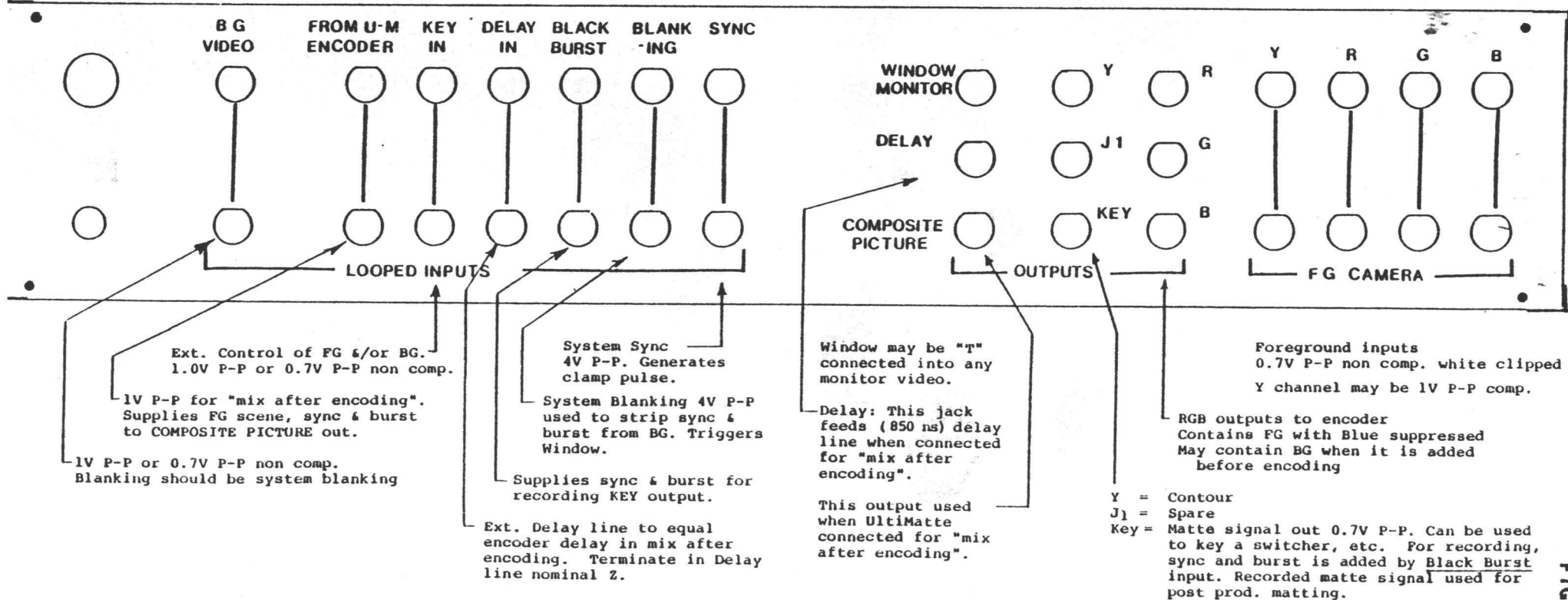


FIG. 2



GROUP 1

2

3

4

5

6

7

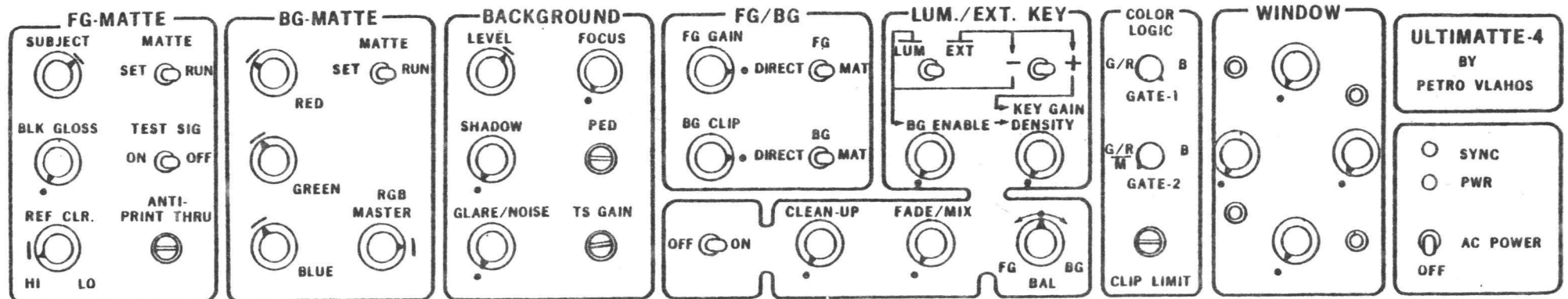


FIG. 1



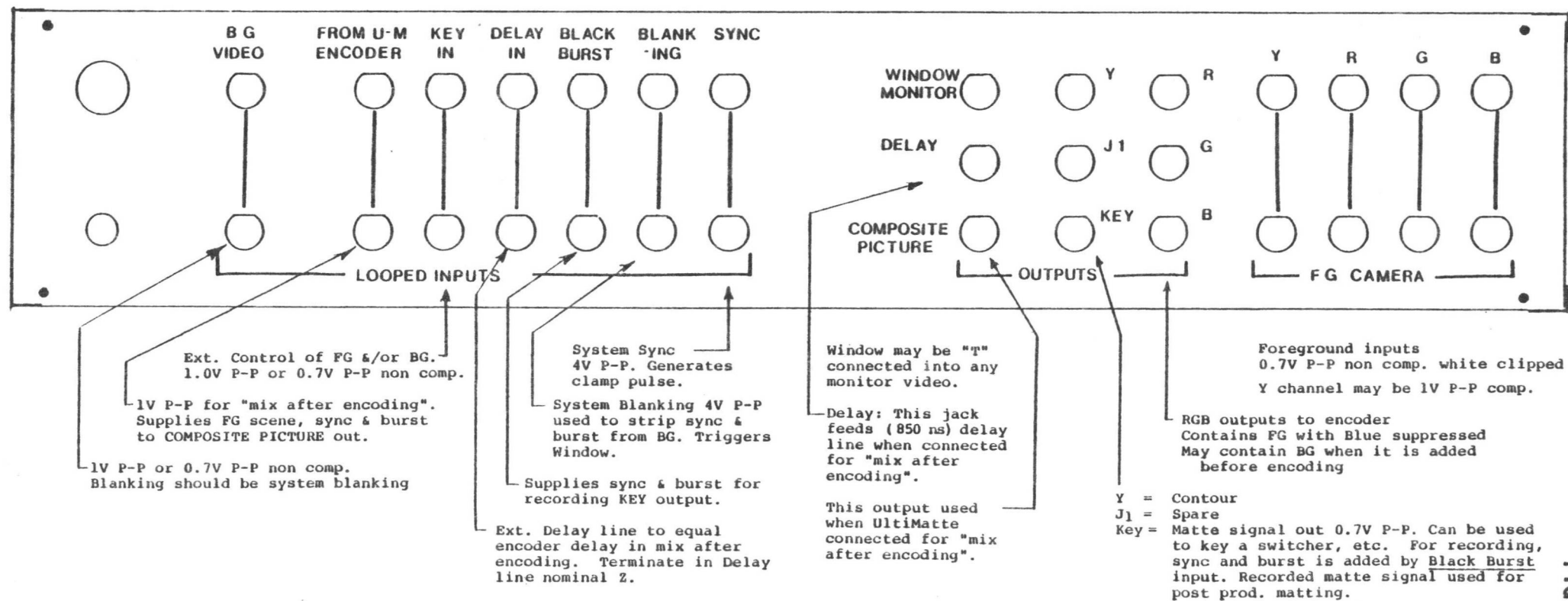
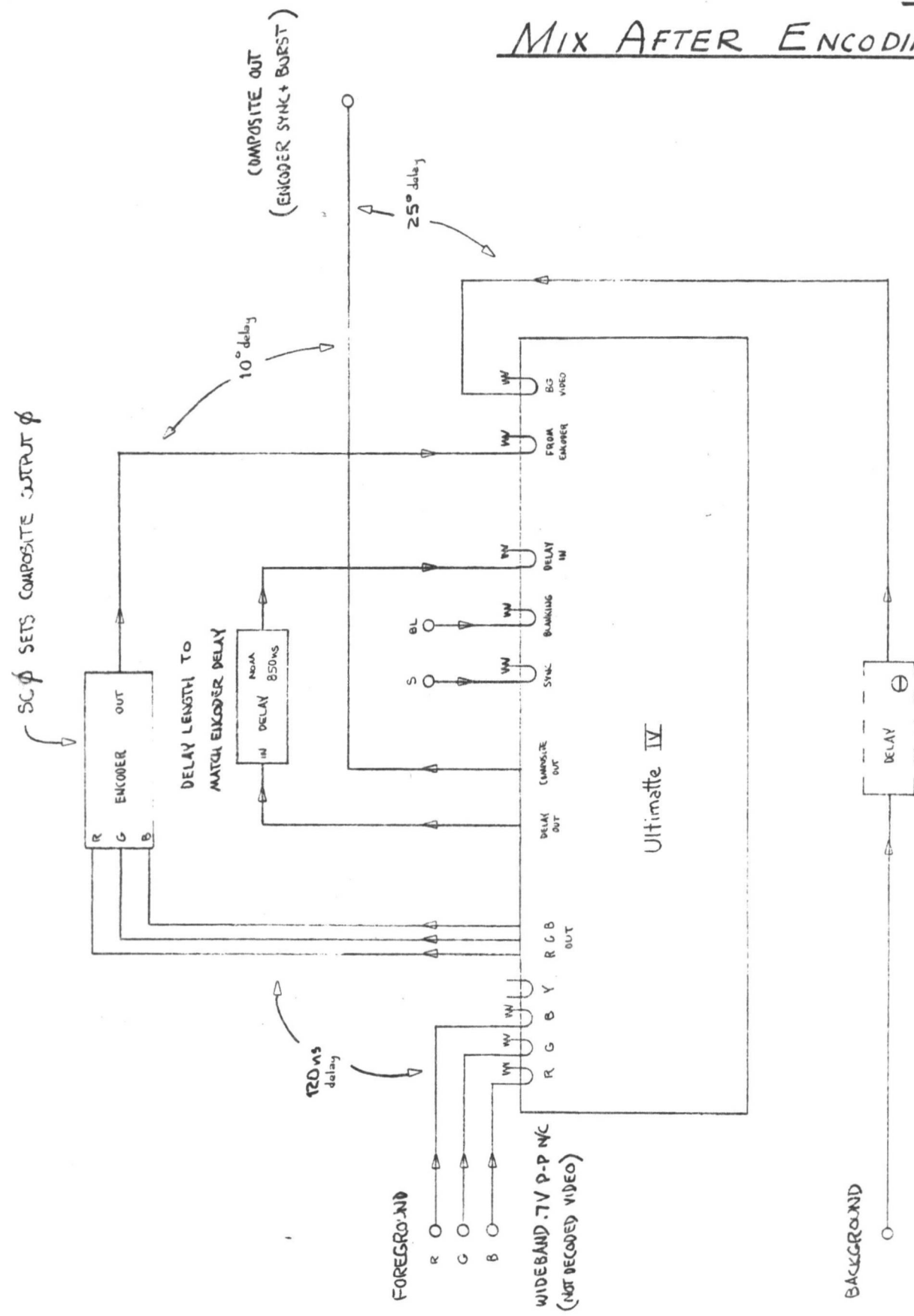


FIG. 2

# FIG. 3

## MIX AFTER ENCODING



DELAY OPTIONAL - 250ns ALLOWS BACKGROUND SCφ ADJUSTMENT TO MATCH COMPOSITE OUT; DELAY WILL BE DIFFERENT IF BACKGROUND SOURCE IS NOT IN φ WITH COMPOSITE OUT (IE. AN ISO BUS OUTPUT, ETC.)

1V P-P OR .7V P-P N/C  
BLINKING ≤ REF BLANKING

MIX AFTER ENCODING

# ULTIMATE PARTS LAY OUT

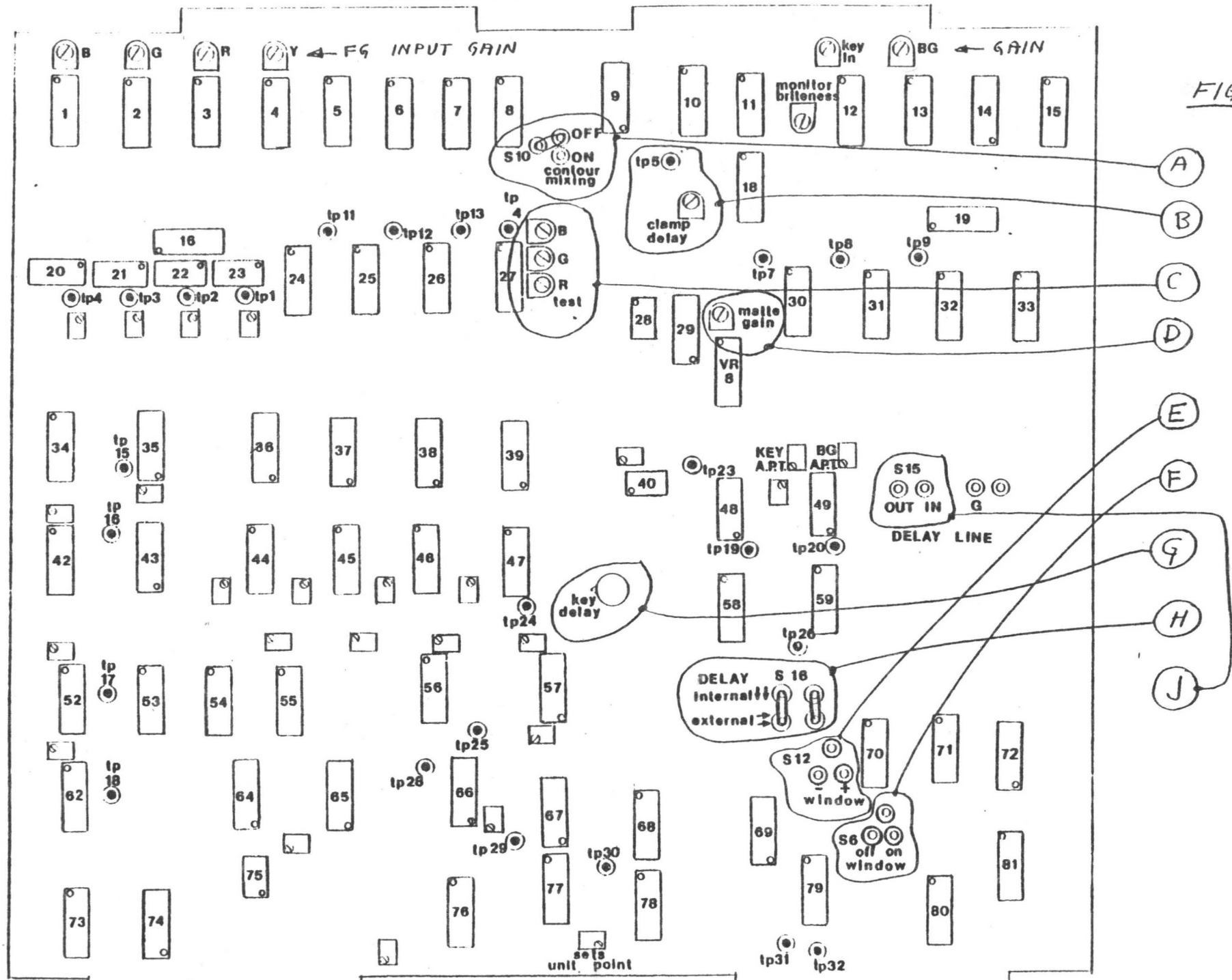


FIG. 4

FIG. 4